

## SEQUENCE LISTING

<110> Smith, Hilda

<120> STREPTOCOCCUS SUIS VACCINES AND DIAGNOSTIC TESTS

<130> 2183-4726

<150> PCT/NL99/00460

<151> 1999-07-19

<150> EP98202465.5

<151> 1998-07-22

<150> EP98202467.1

<151> 1998-07-22

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<170> PatentIn version 3.0

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<223> ORF2Z

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20 25 30

Glu Gly Ala Glu Asn Ile Ile Val Val Thr Ile Thr Gly Gly Leu Ser  
35 40 45

Gly Ser Phe Asn Ala Ala Arg Val Ala Arg Asp Met Tyr Ile Glu Glu  
50 55 60

His Pro Asn Val Asn Ile His Leu Ile Asp Ser Leu Ser Ala Ser Gly  
65 70 75 80

Glu Met Asp Leu Leu Val His Gln Ile Asn Arg Leu Ile Ser Ala Gly  
85 90 95

Leu Asp Phe Pro Gln Val Val Glu Ala Ile Thr His Tyr Arg Glu His  
100 105 110

Ser Lys Leu Leu Phe Val Leu Ala Lys Val Asp Asn Leu Val Lys Asn  
115 120 125

Gly Arg Leu Ser Lys Leu Val Gly Thr Val Val Gly Leu Leu Asn Ile  
130 135 140

Arg Met Val Gly Glu Ala Ser Ala Glu Gly Lys Leu Glu Leu Leu Gln  
145 150 155 160

Lys Ala Arg Gly His Lys Ser Val Thr Ala Ala Phe Glu Glu Met  
165 170 175

Lys Lys Ala Gly Tyr Asp Gly Gly Arg Ile Val Met Ala His Arg Asn  
180 185 190

Asn Ala Lys Phe Phe Gln Gln Phe Ser Glu Leu Val Lys Ala Ser Phe  
195 200 205

Pro Thr Ala Val Ile Asp Glu Val Ala Thr Ser Gly Leu Cys Ser Phe  
210 215 220

Tyr Ala Glu Glu Gly Gly Leu Leu Met Gly Tyr Glu Val Lys Ala  
225 230 235

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20 25 30

Ala Ile Ser Gln Phe Asp Val Lys Lys Met Ala Ala Phe Tyr Lys Leu  
35 40 45

Asn Glu Ala Lys Ala Glu Leu Glu Ala Asp Arg Trp Tyr Arg Ile Arg  
50 55 60

Thr Gly Gln Ala Lys Thr Tyr Pro Ala Trp Gln Leu Tyr Asp Gly Leu  
65 70 75 80

Met Tyr Arg Tyr Met Asp Arg Arg Gly Ile Asp Ser Lys Glu Glu Asn  
85 90 95

Tyr Leu Arg Asp His Val Arg Val Ala Thr Ala Leu Tyr Gly Leu Ile  
100 105 110

His Pro Phe Glu Phe Ile Ser Pro His Arg Leu Asp Phe Gln Gly Ser  
115 120 125

Leu Lys Ile Gly Asn Gln Ser Leu Lys Gln Tyr Trp Arg Pro Tyr Tyr  
130 135 140

Asp Gln Glu Val Gly Asp Asp Glu Leu Ile Leu Ser Leu Ala Ser Ser  
145 150 155 160

Glu Phe Glu Gln Val Phe Ser Pro Gln Ile Gln Lys Arg Leu Val Lys  
165 170 175

Ile Leu Phe Met Glu Glu Ala Gly Gln Leu Lys Val His Ser Thr  
180 185 190

Ile Ser Lys Lys Gly Arg Gly Arg Leu Leu Ser Trp Leu Ala Lys Asn  
195 200 205

Asn Ile Gln Glu Leu Ser Asp Ile Gln Asp Phe Lys Val Asp Gly Phe  
210 215 220

Glu Tyr Cys Thr Ser Glu Ser Thr Ala Asn Gln Leu Thr Phe Ile Arg  
225 230 235 240

Ser Ile Lys Met

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<213> Streptococcus suis

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<223> CPS2A

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Met Lys Lys Arg Ser Gly Arg Ser Lys Ser Ser Lys Phe Lys Leu Val  
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Asn Phe Ala Leu Leu Gly Leu Tyr Ser Ile Thr Leu Cys Leu Phe Leu  
20 25 30

Val Thr Met Tyr Arg Tyr Asn Ile Leu Asp Phe Arg Tyr Leu Asn Tyr  
35 40 45

Ile Val Thr Leu Leu Leu Val Gly Val Ala Val Leu Ala Gly Leu Leu  
50 55 60

Met Trp Arg Lys Lys Ala Arg Ile Phe Thr Ala Leu Leu Leu Val Phe  
65 70 75 80

Ser Leu Val Ile Thr Ser Val Gly Ile Tyr Gly Met Gln Glu Val Val  
85 90 95

Lys Phe Ser Thr Arg Leu Asn Ser Asn Ser Thr Phe Ser Glu Tyr Glu  
100 105 110

Met Ser Ile Leu Val Pro Ala Asn Ser Asp Ile Thr Asp Val Arg Gln  
115 120 125

Leu Thr Ser Ile Leu Ala Pro Ala Glu Tyr Asp Gln Asp Asn Ile Thr  
130 135 140

Ala Leu Leu Asp Asp Ile Ser Lys Met Glu Ser Thr Gln Leu Ala Thr  
145 150 155 160

Ser Pro Gly Thr Ser Tyr Leu Thr Ala Tyr Gln Ser Met Leu Asn Gly  
165 170 175

Glu Ser Gln Ala Met Val Phe Asn Gly Val Phe Thr Asn Ile Leu Glu  
180 185 190

Asn Glu Asp Pro Gly Phe Ser Ser Lys Val Lys Lys Ile Tyr Ser Phe  
195 200 205

Lys Val Thr Gln Thr Val Glu Thr Ala Thr Lys Gln Val Ser Gly Asp  
210 215 220

Ser Phe Asn Ile Tyr Ile Ser Gly Ile Asp Ala Tyr Gly Pro Ile Ser  
225 230 235 240

Thr Val Ser Arg Ser Asp Val Asn Ile Ile Met Thr Val Asn Arg Ala  
245 250 255

Thr His Lys Ile Leu Leu Thr Thr Pro Arg Asp Ser Tyr Val Ala

260            265            270

Phe Ala Asp Gly Gly Gln Asn Gln Tyr Asp Lys Leu Thr His Ala Gly  
275            280            285

Ile Tyr Gly Val Asn Ala Ser Val His Thr Leu Glu Asn Phe Tyr Gly  
290            295            300

Ile Asp Ile Ser Asn Tyr Val Arg Leu Asn Phe Ile Ser Phe Leu Gln  
305            310            315            320

Leu Ile Asp Leu Val Gly Gly Ile Asp Val Tyr Asn Asp Gln Glu Phe  
325            330            335

Thr Ser Leu His Gly Asn Tyr His Phe Pro Val Gly Gln Val His Leu  
340            345            350

Asn Ser Asp Gln Ala Leu Gly Phe Val Arg Glu Arg Tyr Ser Leu Thr  
355            360            365

Gly Gly Asp Asn Asp Arg Gly Lys Asn Gln Glu Lys Val Ile Ala Ala  
370            375            380

Leu Ile Lys Lys Met Ser Thr Pro Glu Asn Leu Lys Asn Tyr Gln Ala  
385            390            395            400

Ile Leu Ser Gly Leu Glu Gly Ser Ile Gln Thr Asp Leu Ser Leu Glu  
405            410            415

Thr Ile Met Ser Leu Val Asn Thr Gln Leu Glu Ser Gly Thr Gln Phe  
420            425            430

Thr Val Glu Ser Gln Ala Leu Thr Gly Thr Gly Arg Ser Asp Leu Ser  
435            440            445

Ser Tyr Ala Met Pro Gly Ser Gln Leu Tyr Met Met Glu Ile Asn Gln  
450            455            460

Asp Ser Leu Glu Gln Ser Lys Ala Ala Ile Gln Ser Val Leu Val Glu  
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<213> Streptococcus suis

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<223> CPS2B

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20           25           30

Leu Thr Ala Gly Leu Ala Phe Val Tyr Ser Ser Phe Leu Val Thr Pro  
35           40           45

Gln Tyr Asp Ser Thr Thr Arg Ile Tyr Val Val Ser Gln Asn Val Glu  
50           55           60

Ala Gly Ala Gly Leu Thr Asn Gln Glu Leu Gln Ala Gly Thr Tyr Leu  
65           70           75           80

Ala Lys Asp Tyr Arg Glu Ile Ile Leu Ser Gln Asp Val Leu Thr Gln  
85           90           95

Val Ala Thr Glu Leu Asn Leu Lys Glu Ser Leu Lys Glu Lys Ile Ser  
100           105           110

Val Ser Ile Pro Val Asp Thr Arg Ile Val Ser Ile Ser Val Arg Asp  
115           120           125

Ala Asp Pro Asn Glu Ala Ala Arg Ile Ala Asn Ser Leu Arg Thr Phe  
130                135                140

Ala Val Gln Lys Val Val Glu Val Thr Lys Val Ser Asp Val Thr Thr  
145                150                155                160

Leu Glu Glu Ala Val Pro Ala Glu Glu Pro Thr Thr Pro Asn Thr Lys  
165                170                175

Arg Asn Ile Leu Leu Gly Leu Leu Ala Gly Gly Ile Leu Ala Thr Gly  
180                185                190

Leu Val Leu Val Met Glu Val Leu Asp Asp Arg Val Lys Arg Pro Gln  
195                200                205

Asp Ile Glu Glu Val Met Gly Leu Thr Leu Leu Gly Ile Val Pro Asp  
210                215                220

Ser Lys Lys Leu Lys  
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<212> PRT

<213> Streptococcus suis

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<223> CPS2C

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Thr Glu Glu Tyr Phe Asn Ala Ile Arg Thr Asn Ile Gln Leu Ser Gly

20            25            30

Ala Asp Ile Lys Val Val Gly Ile Thr Ser Val Lys Ser Asn Glu Gly  
35            40            45

Lys Ser Thr Thr Ala Ala Ser Leu Ala Ile Ala Tyr Ala Arg Ser Gly  
50            55            60

Tyr Lys Thr Val Leu Val Asp Ala Asp Ile Arg Asn Ser Val Met Pro  
65            70            75            80

Gly Phe Phe Lys Pro Ile Thr Lys Ile Thr Gly Leu Thr Asp Tyr Leu  
85            90            95

Ala Gly Thr Thr Asp Leu Ser Gln Gly Leu Cys Asp Thr Asp Ile Pro  
100            105            110

Asn Leu Thr Val Ile Glu Ser Gly Lys Val Ser Pro Asn Pro Thr Ala  
115            120            125

Leu Leu Gln Ser Lys Asn Phe Glu Asn Leu Leu Ala Thr Leu Arg Arg  
130            135            140

Tyr Tyr Asp Tyr Val Ile Val Asp Cys Pro Pro Leu Gly Leu Val Ile  
145            150            155            160

Asp Ala Ala Ile Ile Ala Gln Lys Cys Asp Ala Met Val Ala Val Val  
165            170            175

Glu Ala Gly Asn Val Lys Cys Ser Ser Leu Lys Lys Val Lys Glu Gln  
180            185            190

Leu Glu Gln Thr Gly Thr Pro Phe Leu Gly Val Ile Leu Asn Lys Tyr  
195            200            205

Asp Ile Ala Thr Glu Lys Tyr Ser Glu Tyr Gly Asn Tyr Gly Lys Lys  
210            215            220

Ala  
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<210> 15

<211> 243

<212> PRT

<213> Streptococcus suis

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Met Ile Asp Ile His Ser His Ile Ile Phe Gly Val Asp Asp Gly Pro  
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Lys Thr Ile Glu Glu Ser Leu Ser Leu Ile Ser Glu Ala Tyr Arg Gln  
20           25           30

Gly Val Arg Tyr Ile Val Ala Thr Ser His Arg Arg Lys Gly Met Phe  
35           40           45

Glu Thr Pro Glu Lys Ile Ile Met Ile Asn Phe Leu Gln Leu Lys Glu  
50           55           60

Ala Val Ala Glu Val Tyr Pro Glu Ile Arg Leu Cys Tyr Gly Ala Glu  
65           70           75           80

Leu Tyr Tyr Ser Lys Asp Ile Leu Ser Lys Leu Glu Lys Lys Val  
85           90           95

Pro Thr Leu Asn Gly Ser Cys Tyr Ile Leu Leu Glu Phe Ser Thr Asp  
100          105          110

Thr Pro Trp Lys Glu Ile Gln Glu Ala Val Asn Glu Met Thr Leu Leu  
115          120          125

Gly Leu Thr Pro Val Leu Ala His Ile Glu Arg Tyr Asp Ala Leu Ala  
130          135          140

Phe Gln Ser Glu Arg Val Glu Lys Leu Ile Asp Lys Gly Cys Tyr Thr  
145            150            155            160

Gln Val Asn Ser Asn His Val Leu Lys Pro Ala Leu Ile Gly Glu Arg  
165            170            175

Ala Lys Glu Phe Lys Lys Arg Thr Arg Tyr Phe Leu Glu Gln Asp Leu  
180            185            190

Val His Cys Val Ala Ser Asp Met His Asn Leu Tyr Ser Arg Pro Pro  
195            200            205

Phe Met Arg Glu Ala Tyr Gln Leu Val Lys Lys Glu Tyr Gly Glu Asp  
210            215            220

Arg Ala Lys Ala Leu Phe Lys Lys Asn Pro Leu Leu Ile Leu Lys Asn  
225            230            235            240

Gln Val Gln

<210> 16

<211> 459

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS2E

<400> 16

Met Asn Ile Glu Ile Gly Tyr Arg Gln Thr Lys Leu Ala Leu Phe Asp  
1            5            10            15

Met Ile Ala Val Thr Ile Ser Ala Ile Leu Thr Ser His Ile Pro Asn

20	25	30
Ala Asp Leu Asn Arg Ser Gly Ile Phe Ile Ile Met Met Val His Tyr		
35	40	45
Phe Ala Phe Phe Ile Ser Arg Met Pro Val Glu Phe Glu Tyr Arg Gly		
50	55	60
Asn Leu Ile Glu Phe Glu Lys Thr Phe Asn Tyr Ser Ile Ile Phe Val		
65	70	75
Ile Phe Leu Met Ala Val Ser Phe Met Leu Glu Asn Asn Phe Ala Leu		
85	90	95
Ser Arg Arg Gly Ala Val Tyr Phe Thr Leu Ile Asn Phe Val Leu Val		
100	105	110
Tyr Leu Phe Asn Val Ile Ile Lys Gln Phe Lys Asp Ser Phe Leu Phe		
115	120	125
Ser Thr Thr Tyr Gln Lys Lys Thr Ile Leu Ile Thr Thr Ala Glu Leu		
130	135	140
Trp Glu Asn Met Gln Val Leu Phe Glu Ser Asp Ile Leu Phe Gln Lys		
145	150	155
Asn Leu Val Ala Leu Val Ile Leu Gly Thr Glu Ile Asp Lys Ile Asn		
165	170	175
Leu Pro Leu Pro Leu Tyr Tyr Ser Val Glu Glu Ala Ile Gly Phe Ser		
180	185	190
Thr Arg Glu Val Val Asp Tyr Val Phe Ile Asn Leu Pro Ser Glu Tyr		
195	200	205
Phe Asp Leu Lys Gln Leu Val Ser Asp Phe Glu Leu Leu Gly Ile Asp		
210	215	220
Val Gly Val Asp Ile Asn Ser Phe Gly Phe Thr Val Leu Lys Asn Lys		
225	230	235
Lys Ile Gln Met Leu Gly Asp His Ser Ile Val Thr Phe Ser Thr Asn		
245	250	255

Phe Tyr Lys Pro Ser His Ile Trp Met Lys Arg Leu Leu Asp Ile Leu  
260 265 270

Gly Ala Val Val Gly Leu Ile Ser Gly Ile Val Ser Ile Leu Leu  
275 280 285

Ile Pro Ile Ile Arg Arg Asp Gly Gly Pro Ala Ile Phe Ala Gln Lys  
290 295 300

Arg Val Gly Gln Asn Gly Arg Ile Phe Thr Phe Tyr Lys Phe Arg Ser  
305 310 315 320

Met Phe Val Asp Ala Glu Val Arg Lys Lys Glu Leu Met Ala Gln Asn  
325 330 335

Gln Met Gln Gly Gly Met Phe Lys Met Asp Asn Asp Pro Arg Ile Thr  
340 345 350

Pro Ile Gly His Phe Ile Arg Lys Thr Ser Leu Asp Glu Leu Pro Gln  
355 360 365

Phe Tyr Asn Val Leu Ile Gly Asp Met Ser Leu Val Gly Thr Arg Pro  
370 375 380

Pro Thr Val Asp Glu Phe Glu Lys Tyr Thr Pro Ser Gln Lys Arg Arg  
385 390 395 400

Leu Ser Phe Lys Pro Gly Ile Thr Gly Leu Trp Gln Val Ser Gly Arg  
405 410 415

Ser Asp Ile Thr Asp Phe Asn Glu Val Val Arg Leu Asp Leu Thr Tyr  
420 425 430

Ile Asp Asn Trp Thr Ile Trp Ser Asp Ile Lys Ile Leu Leu Lys Thr  
435 440 445

Val Lys Val Val Leu Leu Arg Glu Gly Gly Gln  
450 455

<210> 17

<211> 389

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS2F

<400> 17

Met Arg Thr Val Tyr Ile Ile Gly Ser Lys Gly Ile Pro Ala Lys Tyr  
1           5           10           15

Gly Gly Phe Glu Thr Phe Val Glu Lys Leu Thr Glu Tyr Gln Lys Asp  
20           25           30

Lys Ser Ile Asn Tyr Phe Val Ala Cys Thr Arg Glu Asn Ser Ala Lys  
35           40           45

Ser Asp Ile Thr Gly Glu Val Phe Glu His Asn Gly Ala Thr Cys Phe  
50           55           60

Asn Ile Asp Val Pro Asn Ile Gly Ser Ala Lys Ala Ile Leu Tyr Asp  
65           70           75           80

Ile Met Ala Leu Lys Lys Ser Ile Glu Ile Ala Lys Asp Arg Asn Asp  
85           90           95

Thr Ser Pro Ile Phe Tyr Ile Leu Ala Cys Arg Ile Gly Pro Phe Ile  
100           105           110

Tyr Leu Phe Lys Lys Gln Ile Glu Ser Ile Gly Gly Gln Leu Phe Val  
115           120           125

Asn Pro Asp Gly His Glu Trp Leu Arg Glu Lys Trp Ser Tyr Pro Val  
130           135           140

Arg Gln Tyr Trp Lys Phe Ser Glu Ser Leu Met Leu Lys Tyr Ala Asp  
145           150           155           160

Leu Leu Ile Cys Asp Ser Lys Asn Ile Glu Lys Tyr Ile His Glu Asp  
165 170 175

Tyr Arg Lys Tyr Ala Pro Glu Thr Ser Tyr Ile Ala Tyr Gly Thr Asp  
180 185 190

Leu Asp Lys Ser Arg Leu Ser Pro Thr Asp Ser Val Val Arg Glu Trp  
195 200 205

Tyr Lys Glu Lys Glu Ile Ser Glu Asn Asp Tyr Tyr Leu Val Val Gly  
210 215 220

Arg Phe Val Pro Glu Asn Asn Tyr Glu Val Met Ile Arg Glu Phe Met  
225 230 235 240

Lys Ser Tyr Ser Arg Lys Asp Phe Val Leu Ile Thr Asn Val Glu His  
245 250 255

Asn Ser Phe Tyr Glu Lys Leu Lys Glu Thr Gly Phe Asp Lys Asp  
260 265 270

Lys Arg Ile Lys Phe Val Gly Thr Val Tyr Asn Gln Glu Leu Leu Lys  
275 280 285

Tyr Ile Arg Glu Asn Ala Phe Ala Tyr Phe His Gly His Glu Val Gly  
290 295 300

Gly Thr Asn Pro Ser Leu Leu Glu Ala Leu Ser Ser Thr Lys Leu Asn  
305 310 315 320

Leu Leu Leu Asp Val Gly Phe Asn Arg Glu Val Gly Glu Gly Ala  
325 330 335

Lys Tyr Trp Asn Lys Asp Asn Leu His Arg Val Ile Asp Ser Cys Glu  
340 345 350

Gln Leu Ser Gln Glu Gln Ile Asn Asp Met Asp Ser Leu Ser Thr Lys  
355 360 365

Gln Val Lys Glu Arg Phe Ser Trp Asp Phe Ile Val Asp Glu Tyr Glu  
370 375 380

Lys Leu Phe Lys Gly

385

<210> 18

<211> 385

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS2G

<400> 18

Met Lys Lys Ile Leu Tyr Leu His Ala Gly Ala Glu Leu Tyr Gly Ala  
1           5           10           15

Asp Lys Val Leu Leu Glu Leu Ile Lys Gly Leu Asp Lys Asn Glu Phe  
20           25           30

Glu Ala His Val Ile Leu Pro Asn Asp Gly Val Leu Val Pro Ala Leu  
35           40           45

Arg Glu Val Gly Ala Gln Val Glu Val Ile Asn Tyr Pro Ile Leu Arg  
50           55           60

Arg Lys Tyr Phe Asn Pro Lys Gly Ile Phe Asp Tyr Phe Ile Ser Tyr  
65           70           75           80

His His Tyr Ser Lys Gln Ile Ala Gln Tyr Ala Ile Glu Asn Lys Val  
85           90           95

Asp Ile Ile His Asn Asn Thr Thr Ala Val Leu Glu Gly Ile Tyr Leu  
100           105           110

Lys Arg Lys Leu Lys Leu Pro Leu Leu Trp His Val His Glu Ile Ile  
115           120           125

Val Lys Pro Lys Phe Ile Ser Asp Ser Ile Asn Phe Leu Met Gly Arg  
130                135                140

Phe Ala Asp Lys Ile Val Thr Val Ser Gln Ala Val Ala Asn His Ile  
145                150                155                160

Lys Gln Ser Pro His Ile Lys Asp Asp Gln Ile Ser Val Ile Tyr Asn  
165                170                175

Gly Val Asp Asn Lys Val Phe Tyr Gln Ser Asp Ala Arg Ser Val Arg  
180                185                190

Glu Arg Phe Asp Ile Asp Glu Glu Ala Leu Val Ile Gly Met Val Gly  
195                200                205

Arg Val Asn Ala Trp Lys Gly Gln Gly Asp Phe Leu Glu Ala Val Ala  
210                215                220

Pro Ile Leu Glu Gln Asn Pro Lys Ala Ile Ala Phe Ile Ala Gly Ser  
225                230                235                240

Ala Phe Glu Gly Glu Glu Trp Arg Val Val Glu Leu Glu Lys Lys Ile  
245                250                255

Ser Gln Leu Lys Val Ser Ser Gln Val Arg Arg Met Asp Tyr Tyr Ala  
260                265                270

Asn Thr Thr Glu Leu Tyr Asn Met Phe Asp Ile Phe Val Leu Pro Ser  
275                280                285

Thr Asn Pro Asp Pro Leu Pro Thr Val Val Leu Lys Ala Met Ala Cys  
290                295                300

Gly Lys Pro Val Val Gly Tyr Arg His Gly Gly Val Cys Glu Met Val  
305                310                315                320

Lys Glu Gly Val Asn Gly Phe Leu Val Thr Pro Asn Ser Pro Leu Asn  
325                330                335

Leu Ser Lys Val Ile Leu Gln Leu Ser Glu Asn Ile Asn Leu Arg Lys  
340                345                350

Lys Ile Gly Asn Asn Ser Ile Glu Arg Gln Lys Glu His Phe Ser Leu

355            360            365

Lys Ser Tyr Val Lys Asn Phe Ser Lys Val Tyr Thr Ser Leu Lys Val  
370            375            380

Tyr  
385

<210> 19

<211> 456

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> cps2h

<400> 19

Met Lys Ile Ile Ser Phe Thr Met Val Asn Asn Glu Ser Glu Ile Ile  
1            5            10            15

Glu Ser Phe Ile Arg Tyr Asn Tyr Asn Phe Ile Asp Glu Met Val Ile  
20            25            30

Ile Asp Asn Gly Cys Thr Asp Asn Thr Met Gln Ile Ile Phe Asn Leu  
35            40            45

Ile Lys Glu Gly Tyr Lys Ile Ser Val Tyr Asp Glu Ser Leu Glu Ala  
50            55            60

Tyr Asn Gln Tyr Arg Leu Asp Asn Lys Tyr Leu Thr Lys Ile Ile Ala  
65            70            75            80

Glu Lys Asn Pro Asp Leu Ile Ile Pro Leu Asp Ala Asp Glu Phe Leu  
85            90            95

Thr Ala Asp Ser Asn Pro Arg Lys Leu Leu Glu Gln Leu Asp Leu Glu  
100 105 110

Lys Ile His Tyr Val Asn Trp Gln Trp Phe Val Met Thr Lys Lys Asp  
115 120 125

Asp Ile Asn Asp Ser Phe Ile Pro Arg Arg Met Gln Tyr Cys Phe Glu  
130 135 140

Lys Pro Val Trp His His Ser Asp Gly Lys Pro Val Thr Lys Cys Ile  
145 150 155 160

Ile Ser Ala Lys Tyr Tyr Lys Met Asn Leu Lys Leu Ser Met Gly  
165 170 175

His His Thr Val Phe Gly Asn Pro Asn Val Arg Ile Glu His His Asn  
180 185 190

Asp Leu Lys Phe Ala His Tyr Arg Ala Ile Ser Gln Glu Gln Leu Ile  
195 200 205

Tyr Lys Thr Ile Cys Tyr Thr Ile Arg Asp Ile Ala Thr Met Glu Asn  
210 215 220

Asn Ile Glu Thr Ala Gln Arg Thr Asn Gln Met Ala Leu Ile Glu Ser  
225 230 235 240

Gly Val Asp Met Trp Glu Thr Ala Arg Glu Ala Ser Tyr Ser Gly Tyr  
245 250 255

Asp Cys Asn Val Ile His Ala Pro Ile Asp Leu Ser Phe Cys Lys Glu  
260 265 270

Asn Ile Val Ile Lys Tyr Asn Glu Leu Ser Arg Glu Thr Val Ala Glu  
275 280 285

Arg Val Met Lys Thr Gly Arg Glu Met Ala Val Arg Ala Tyr Asn Val  
290 295 300

Glu Arg Lys Gln Lys Glu Lys Lys Phe Leu Lys Pro Ile Ile Phe Val  
305 310 315 320

Leu Asp Gly Leu Lys Gly Asp Glu Tyr Ile His Pro Asn Pro Ser Asn

325                  330                  335

His Leu Thr Ile Leu Thr Glu Met Tyr Asn Val Arg Gly Leu Leu Thr  
340                  345                  350

Asp Asn His Gln Ile Lys Phe Leu Lys Val Asn Tyr Arg Leu Ile Ile  
355                  360                  365

Thr Pro Asp Phe Ala Lys Phe Leu Pro His Glu Phe Ile Val Val Pro  
370                  375                  380

Asp Thr Leu Asp Ile Glu Gln Val Lys Ser Gln Tyr Val Gly Thr Gly  
385                  390                  395                  400

Val Asp Leu Ser Lys Ile Ile Ser Leu Lys Glu Tyr Arg Lys Glu Ile  
405                  410                  415

Gly Phe Ile Gly Asn Leu Tyr Ala Leu Leu Gly Phe Val Pro Asn Met  
420                  425                  430

Leu Asn Arg Ile Tyr Leu Tyr Ile Gln Arg Asn Gly Ile Ala Asn Thr  
435                  440                  445

Ile Ile Lys Ile Lys Ser Arg Leu  
450                  455

<210> 20

<211> 410

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS2I

<400> 20

Met Gln Ala Asp Arg Arg Lys Thr Phe Gly Lys Met Arg Ile Arg Ile  
1 5 10 15

Asn Asn Leu Phe Phe Val Ala Ile Ala Phe Met Gly Ile Ile Ile Ser  
20 25 30

Asn Ser Gln Val Val Leu Ala Ile Gly Lys Ala Ser Val Ile Gln Tyr  
35 40 45

Leu Ser Tyr Leu Val Leu Ile Leu Cys Ile Val Asn Asp Leu Leu Lys  
50 55 60

Asn Asn Lys His Ile Val Val Tyr Lys Leu Gly Tyr Leu Phe Leu Ile  
65 70 75 80

Ile Phe Leu Phe Thr Ile Gly Ile Cys Gln Gln Ile Leu Pro Ile Thr  
85 90 95

Thr Lys Ile Tyr Leu Ser Ile Ser Met Met Ile Ile Ser Val Leu Ala  
100 105 110

Thr Leu Pro Ile Ser Leu Ile Lys Asp Ile Asp Asp Phe Arg Arg Ile  
115 120 125

Ser Asn His Leu Leu Phe Ala Leu Phe Ile Thr Ser Ile Leu Gly Ile  
130 135 140

Lys Met Gly Ala Thr Met Phe Thr Gly Ala Val Glu Gly Ile Gly Phe  
145 150 155 160

Ser Gln Gly Phe Asn Gly Gly Leu Thr His Lys Asn Phe Phe Gly Ile  
165 170 175

Thr Ile Leu Met Gly Phe Val Leu Thr Tyr Leu Ala Tyr Lys Tyr Gly  
180 185 190

Ser Tyr Lys Arg Thr Asp Arg Phe Ile Leu Gly Leu Glu Leu Phe Leu  
195 200 205

Ile Leu Ile Ser Asn Thr Arg Ser Val Tyr Leu Ile Leu Leu Phe  
210 215 220

Leu Phe Leu Val Asn Leu Asp Lys Ile Lys Ile Glu Gln Arg Gln Trp  
225            230            235            240

Ser Thr Leu Lys Tyr Ile Ser Met Leu Phe Cys Ala Ile Phe Leu Tyr  
245            250            255

Tyr Phe Phe Gly Phe Leu Ile Thr His Ser Asp Ser Tyr Ala His Arg  
260            265            270

Val Asn Gly Leu Ile Asn Phe Phe Glu Tyr Tyr Arg Asn Asp Trp Phe  
275            280            285

His Leu Met Phe Gly Ala Ala Asp Leu Ala Tyr Gly Asp Leu Thr Leu  
290            295            300

Asp Tyr Ala Ile Arg Val Arg Arg Val Leu Gly Trp Asn Gly Thr Leu  
305            310            315            320

Glu Met Pro Leu Leu Ser Ile Met Leu Lys Asn Gly Phe Ile Gly Leu  
325            330            335

Val Gly Tyr Gly Ile Val Leu Tyr Lys Leu Tyr Arg Asn Val Arg Ile  
340            345            350

Leu Lys Thr Asp Asn Ile Lys Thr Ile Gly Lys Ser Val Phe Ile Ile  
355            360            365

Val Val Leu Ser Ala Thr Val Glu Asn Tyr Ile Val Asn Leu Ser Phe  
370            375            380

Val Phe Met Pro Ile Cys Phe Cys Leu Leu Asn Ser Ile Ser Thr Met  
385            390            395            400

Glu Ser Thr Ile Asn Lys Gln Leu Gln Thr  
405            410

<210> 21

<211> 332

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS2J

<400> 21

Met Glu Lys Val Ser Ile Ile Val Pro Ile Phe Asn Thr Glu Lys Tyr  
1           5           10           15

Leu Arg Glu Cys Leu Asp Ser Ile Ile Ser Gln Ser Tyr Thr Asn Leu  
20           25           30

Glu Ile Leu Leu Ile Asp Asp Gly Ser Ser Asp Ser Ser Thr Asp Ile  
35           40           45

Cys Leu Glu Tyr Ala Glu Gln Asp Gly Arg Ile Lys Leu Phe Arg Leu  
50           55           60

Pro Asn Gly Gly Val Ser Asn Ala Arg Asn Tyr Gly Ile Lys Asn Ser  
65           70           75           80

Thr Ala Asn Tyr Ile Met Phe Val Asp Ser Asp Asp Ile Val Asp Gly  
85           90           95

Asn Ile Val Glu Ser Leu Tyr Thr Cys Leu Lys Glu Asn Asp Ser Asp  
100           105           110

Leu Ser Gly Gly Leu Leu Ala Thr Phe Asp Gly Asn Tyr Gln Glu Ser  
115           120           125

Glu Leu Gln Lys Cys Gln Ile Asp Leu Glu Glu Ile Lys Glu Val Arg  
130           135           140

Asp Leu Gly Asn Glu Asn Phe Pro Asn His Tyr Met Ser Gly Ile Phe  
145           150           155           160

Asn Ser Pro Cys Cys Lys Leu Tyr Lys Asn Ile Tyr Ile Asn Gln Gly  
165           170           175

Phe Asp Thr Glu Gln Trp Leu Gly Glu Asp Leu Leu Phe Asn Leu Asn  
180 185 190

Tyr Leu Lys Asn Ile Lys Lys Val Arg Tyr Val Asn Arg Asn Leu Tyr  
195 200 205

Phe Ala Arg Arg Ser Leu Gln Ser Thr Thr Asn Thr Phe Lys Tyr Asp  
210 215 220

Val Phe Ile Gln Leu Glu Asn Leu Glu Glu Lys Thr Phe Asp Leu Phe  
225 230 235 240

Val Lys Ile Phe Gly Gly Gln Tyr Glu Phe Ser Val Phe Lys Glu Thr  
245 250 255

Leu Gln Trp His Ile Ile Tyr Tyr Ser Leu Leu Met Phe Lys Asn Gly  
260 265 270

Asp Glu Ser Leu Pro Lys Lys Leu His Ile Phe Lys Tyr Leu Tyr Asn  
275 280 285

Arg His Ser Leu Asp Thr Leu Ser Ile Lys Arg Thr Ser Ser Val Phe  
290 295 300

Lys Arg Ile Cys Lys Leu Ile Val Ala Asn Asn Leu Phe Lys Ile Phe  
305 310 315 320

Leu Asn Thr Leu Ile Arg Glu Glu Lys Asn Asn Asp  
325 330

<210> 22

<211> 332

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS2K

<400> 22

Met Ile Asn Ile Ser Ile Ile Val Pro Ile Tyr Asn Val Glu Gln Tyr  
1 5 10 15

Leu Ser Lys Cys Ile Asn Ser Ile Val Asn Gln Thr Tyr Lys His Ile  
20 25 30

Glu Ile Leu Leu Val Asn Asp Gly Ser Thr Asp Asn Ser Glu Glu Ile  
35 40 45

Cys Leu Ala Tyr Ala Lys Lys Asp Ser Arg Ile Arg Tyr Phe Lys Lys  
50 55 60

Glu Asn Gly Gly Leu Ser Asp Ala Arg Asn Tyr Gly Ile Ser Arg Ala  
65 70 75 80

Lys Gly Asp Tyr Leu Ala Phe Ile Asp Ser Asp Asp Phe Ile His Ser  
85 90 95

Glu Phe Ile Gln Arg Leu His Glu Ala Ile Glu Arg Glu Asn Ala Leu  
100 105 110

Val Ala Val Ala Gly Tyr Asp Arg Val Asp Ala Ser Gly His Phe Leu  
115 120 125

Thr Ala Glu Pro Leu Pro Thr Asn Gln Ala Val Leu Ser Gly Arg Asn  
130 135 140

Val Cys Lys Lys Leu Leu Glu Ala Asp Gly His Arg Phe Val Val Ala  
145 150 155 160

Trp Asn Lys Leu Tyr Lys Lys Glu Leu Phe Asp Phe Arg Phe Glu Lys  
165 170 175

Gly Lys Ile His Glu Asp Glu Tyr Phe Thr Tyr Arg Leu Leu Tyr Glu  
180 185 190

Leu Glu Lys Val Ala Ile Val Lys Glu Cys Leu Tyr Tyr Val Asp

195                  200                  205

Arg Glu Asn Ser Ile Ile Thr Ser Ser Met Thr Asp His Arg Phe His  
210                  215                  220

Cys Leu Leu Glu Phe Gln Asn Glu Arg Met Asp Phe Tyr Glu Ser Arg  
225                  230                  235                  240

Gly Asp Lys Glu Leu Leu Leu Glu Cys Tyr Arg Ser Phe Leu Ala Phe  
245                  250                  255

Ala Val Leu Phe Leu Gly Lys Tyr Asn His Trp Leu Ser Lys Gln Gln  
260                  265                  270

Lys Lys Leu Gln Thr Leu Phe Arg Ile Val Tyr Lys Gln Leu Lys Gln  
275                  280                  285

Asn Lys Arg Leu Ala Leu Leu Met Asn Ala Tyr Tyr Leu Val Gly Cys  
290                  295                  300

Leu His Leu Asn Phe Ser Val Phe Leu Lys Thr Gly Lys Asp Lys Ile  
305                  310                  315                  320

Gln Glu Arg Leu Arg Arg Ser Glu Ser Ser Thr Arg  
325                  330

<210> 23

<211> 467

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS2O

<220>

<221> misc\_feature

<222> (1)..(467)

<223> Xaa may be any amino acid

<400> 23

Met Ser Lys Lys Ser Ile Val Val Ser Gly Leu Val Tyr Thr Ile Gly  
1           5           10           15

Thr Ile Leu Val Gln Gly Leu Ala Phe Ile Thr Leu Pro Ile Tyr Thr  
20           25           30

Arg Val Ile Ser Gln Glu Val Tyr Gly Gln Phe Ser Leu Tyr Asn Ser  
35           40           45

Trp Val Gly Leu Val Gly Leu Phe Ile Gly Leu Gln Leu Gly Ala  
50           55           60

Phe Gly Pro Gly Trp Val His Phe Arg Glu Lys Phe Asp Asp Phe Val  
65           70           75           80

Ser Thr Leu Met Val Ser Ser Ile Ala Phe Phe Leu Pro Ile Phe Gly  
85           90           95

Leu Ser Phe Leu Leu Ser Gln Pro Leu Ser Leu Leu Phe Gly Leu Pro  
100          105          110

Asp Trp Val Val Pro Leu Ile Phe Leu Gln Ser Leu Met Ile Val Val  
115          120          125

Gln Gly Phe Phe Thr Thr Tyr Leu Val Gln Arg Gln Gln Ser Met Trp  
130          135          140

Thr Leu Pro Leu Ser Val Leu Ser Ala Val Ile Asn Thr Ala Leu Ser  
145          150          155          160

Leu Phe Leu Thr Phe Pro Met Glu Asn Asp Phe Ile Ala Arg Val Met

165                  170                  175

Ala Asn Pro Ala Thr Thr Gly Val Leu Ala Cys Val Ser Xaa Trp Phe  
180                  185                  190

Ser Gln Lys Lys Asn Gly Leu His Phe Arg Lys Asp Tyr Leu Arg Tyr  
195                  200                  205

Gly Leu Ser Ile Ser Ile Pro Leu Ile Phe His Gly Leu Gly His Asn  
210                  215                  220

Val Leu Asn Gln Phe Asp Arg Ile Met Leu Gly Lys Met Leu Thr Leu  
225                  230                  235                  240

Ser Asp Val Ala Leu Tyr Ser Phe Gly Tyr Thr Leu Ala Ser Ile Leu  
245                  250                  255

Gln Ile Val Phe Ser Ser Leu Asn Thr Val Trp Cys Pro Trp Tyr Phe  
260                  265                  270

Glu Lys Lys Arg Gly Ala Asp Lys Asp Leu Leu Ser Tyr Val Arg Tyr  
275                  280                  285

Tyr Leu Ala Ile Gly Leu Phe Val Thr Phe Gly Phe Leu Thr Ile Tyr  
290                  295                  300

Pro Arg Leu Ala Met Leu Leu Gly Gly Ser Glu Tyr Arg Phe Ser Met  
305                  310                  315                  320

Gly Phe Ile Pro Met Ile Ile Val Gly Val Phe Phe Val Phe Leu Tyr  
325                  330                  335

Ser Phe Pro Ala Asn Ile Gln Phe Tyr Ser Gly Asn Thr Lys Phe Leu  
340                  345                  350

Pro Ile Gly Thr Phe Ile Ala Gly Val Leu Asn Ile Ser Val His Phe  
355                  360                  365

Val Leu Ile Pro Thr Lys Asn Leu Trp Cys Cys Phe Ala Thr Thr Ala  
370                  375                  380

Ser Tyr Leu Leu Leu Leu Val Leu His Tyr Phe Val Ala Lys Lys Lys  
385                  390                  395                  400

Tyr Ala Tyr Asp Glu Val Ala Ile Ser Thr Phe Val Lys Val Ile Ala  
405 410 415

Leu Val Val Val Tyr Thr Gly Leu Met Thr Val Phe Val Gly Ser Ile  
420 425 430

Trp Ile Arg Trp Ser Leu Gly Ile Ala Val Leu Val Val Tyr Ala Ile  
435 440 445

Tyr Phe Arg Lys Glu Leu Thr Val Ala Leu Asn Thr Phe Arg Glu Lys  
450 455 460

Arg Ser Lys  
465

<210> 24

<211> 338

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS2P

<400> 24

Met Val Tyr Ile Ile Ala Glu Ile Gly Cys Asn His Asn Gly Asp Val  
1 5 10 15

His Leu Ala Arg Lys Met Val Glu Val Ala Val Asp Cys Gly Val Asp  
20 25 30

Ala Val Lys Phe Gln Thr Glu Lys Ala Asp Leu Leu Ile Ser Lys Tyr  
35 40 45

Ala Pro Lys Ala Glu Tyr Gln Lys Ile Thr Thr Gly Glu Ser Asp Ser  
50 55 60

Gln Leu Glu Met Thr Arg Arg Leu Glu Leu Ser Phe Glu Glu Tyr Leu  
65            70            75            80

Asp Leu Arg Asp Tyr Cys Leu Glu Lys Gly Val Asp Val Phe Ser Thr  
85            90            95

Pro Glu Asp Glu Glu Ser Leu Asp Phe Leu Ile Ser Thr Asp Met Pro  
100            105            110

Val Tyr Lys Ile Pro Ser Gly Glu Ile Thr Asn Leu Pro Tyr Leu Glu  
115            120            125

Lys Ile Gly Arg Gln Ala Lys Lys Val Ile Leu Ser Thr Gly Met Ala  
130            135            140

Val Met Asp Glu Ile His Gln Ala Val Lys Ile Leu Gln Glu Asn Gly  
145            150            155            160

Thr Thr Asp Ile Ser Ile Leu His Cys Thr Thr Glu Tyr Pro Thr Pro  
165            170            175

Tyr Pro Ala Leu Asn Leu Asn Val Leu His Thr Leu Lys Lys Glu Phe  
180            185            190

Pro Asn Leu Thr Ile Gly Tyr Ser Asp His Ser Val Gly Ser Glu Val  
195            200            205

Pro Ile Ala Ala Ala Ala Met Gly Ala Glu Leu Ile Glu Lys His Phe  
210            215            220

Thr Leu Asp Asn Glu Met Glu Gly Pro Asp His Lys Ala Ser Ala Thr  
225            230            235            240

Pro Asp Ile Leu Ala Ala Leu Val Lys Gly Val Arg Ile Val Glu Gln  
245            250            255

Ser Leu Gly Lys Phe Glu Lys Glu Pro Glu Glu Val Glu Val Arg Asn  
260            265            270

Lys Ile Val Ala Glu Lys Ser Ile Val Ala Lys Lys Ala Ile Ala Lys  
275            280            285

Gly Glu Val Phe Thr Glu Glu Asn Ile Thr Val Lys Arg Pro Gly Asn

290            295            300

Gly Ile Ser Pro Met Glu Trp Tyr Lys Val Leu Gly Gln Val Ser Glu  
305            310            315            320

Gln Asp Phe Glu Glu Asp Gln Asn Ile Cys His Ser Ala Phe Glu Asn  
325            330            335

Gln Met

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Met Arg Arg Leu Leu Ser Tyr Leu Gln Asp Asp Pro Glu Met Glu Leu  
20            25            30

Asp Leu Val Val Ala Thr Met His Leu Glu Glu Lys Tyr Gly Met Thr  
35            40            45

Val Lys Asp Ile Glu Ala Asp Lys Arg Arg Ile Val Lys Arg Ile Pro  
50            55            60

Leu His Leu Thr Asp Thr Ser Lys Gln Thr Ile Val Lys Ser Leu Ala  
65            70            75            80

Thr Leu Thr Glu Gln Leu Thr Val Leu Phe Glu Glu Val Gln Tyr Asp

85                  90                  95

Leu Val Leu Ile Leu Gly Asp Arg Tyr Glu Met Leu Pro Val Ala Asn  
100                  105                  110

Ala Ala Leu Leu Tyr Asn Ile Pro Ile Cys His Ile His Gly Gly Glu  
115                  120                  125

Lys Thr Met Gly Asn Phe Asp Glu Ser Ile Arg His Ala Ile Thr Lys  
130                  135                  140

Met Ser His Leu His Leu Thr Ser Thr Asp Glu Phe Arg Asn Arg Val  
145                  150                  155                  160

Ile Gln Leu Gly Glu Asn Pro Thr Met Tyr  
165                  170

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<223> CPS2R

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Met Glu Leu Gly Ile Asp Phe Ala Glu Asp Tyr Tyr Val Val Leu Phe  
1                  5                  10                  15

His Pro Val Thr Leu Glu Asp Asn Thr Ala Glu Glu Gln Thr Gln Ala  
20                  25                  30

Leu Leu Asp Ala Leu Lys Glu Asp Gly Ser Gln Cys Leu Ile Ile Gly  
35                  40                  45

Ser Asn Ser Asp Thr His Ala Asp Lys Ile Met Glu Leu Met His Glu

50 55 60

Phe Val Lys Gln Asp Ser Asp Ser Tyr Ile Phe Thr Ser Leu Pro Thr  
65 70 75 80

Arg Tyr Tyr His Ser Leu Val Lys His Ser Gln Gly Leu Ile Gly Asn  
85 90 95

Ser Ser Ser Gly Leu Ile Glu Val Pro Ser Leu Gln Val Pro Thr Leu  
100 105 110

Asn Ile Gly Asn Arg Gln Phe Gly Arg Leu Ser Gly Pro Ser Val Val  
115 120 125

His Val Gly Thr Ser Lys Glu Ala Ile Val Gly Leu Gly Gln Leu  
130 135 140

Arg Asp Val Ile Asp Phe Thr Asn Pro Phe Glu Gln Pro Asp Ser Ala  
145 150 155 160

Leu Gln Gly Tyr Arg Ala Ile Lys Glu Phe Leu Ser Val Gln Ala Ser  
165 170 175

Thr Met Lys Glu Phe Tyr Asp Arg  
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<223> CPS2S

<400> 27

Met Lys Lys Val Ala Phe Leu Gly Ala Gly Thr Phe Ser Asp Gly Val  
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Leu Pro Trp Leu Asp Arg Thr Arg Tyr Glu Leu Ile Gly Tyr Phe Glu  
20 25 30

Asp Lys Pro Ile Ser Asp Tyr Arg Gly Tyr Pro Val Phe Gly Pro Leu  
35 40 45

Gln Asp Val Leu Thr Tyr Leu Asp Asp Gly Lys Val Asp Ala Val Phe  
50 55 60

Val Thr Ile Gly Asp Asn Val Lys Arg Lys Glu Ile Phe Asp Leu Leu  
65 70 75 80

Ala Lys Asp His Tyr Asp Ala Leu Phe Asn Ile Ile Ser Glu Gln Ala  
85 90 95

Asn Ile Phe Ser Pro Asp Ser Ile Lys Gly Arg Gly Val Phe Ile Gly  
100 105 110

Phe Ser Ser Phe Val Gly Ala Asp Ser Tyr Val Tyr Asp Asn Cys Ile  
115 120 125

Ile Asn Thr Gly Ala Ile Val Glu His His Thr Thr Val Glu Ala His  
130 135 140

Cys Asn Ile Thr Pro Gly Val Thr Ile Asn Gly Leu Cys Arg Ile Gly  
145 150 155 160

Glu Ser Thr Tyr Ile Gly Ser Gly Ser Thr Val Ile Gln Cys Ile Glu  
165 170 175

Ile Ala Pro Tyr Thr Thr Leu Gly Ala Gly Thr Val Val Leu Lys Ser  
180 185 190

Leu Thr Glu Ser Gly Thr Tyr Val Gly Val Pro Ala Arg Lys Ile Lys  
195 200 205

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<223> CPS2T

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Met Glu Pro Ile Cys Leu Ile Pro Ala Arg Ser Gly Ser Lys Gly Leu  
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Pro Asn Lys Asn Met Leu Phe Leu Asp Gly Val Pro Met Ile Phe His  
20 25 30

Thr Ile Arg Ala Ala Ile Glu Ser Gly Cys Phe Lys Lys Glu Asn Ile  
35 40 45

Tyr Val Ser Thr Asp Ser Glu Val Tyr Lys Glu Ile Cys Glu Thr Thr  
50 55 60

Gly Val Gln Val Leu Met Arg Pro Ala Asp Leu Ala Thr Asp Phe Thr  
65 70 75 80

Thr Ser Phe Gln Leu Asn Glu His Phe Leu Gln Asp Phe Ser Asp Asp  
85 90 95

Gln Val Phe Val Leu Leu Gln Val Thr Ser Pro Leu Arg Ser Gly Lys  
100 105 110

His Val Lys Glu Ala Met Glu Leu Tyr Gly Lys Gly Gln Ala Asp His  
115 120 125

Val Val Ser Phe Thr Lys Val Asp Lys Ser Pro Thr Leu Phe Ser Thr  
130 135 140

Leu Asp Glu Asn Gly Phe Ala Lys Asp Ile Ala Gly Leu Gly Gly Ser  
145 150 155 160

Tyr Arg Arg Gln Asp Glu Lys Thr Leu Tyr Tyr Pro Asn Gly Ala Ile  
165 170 175

Tyr Ile Ser Ser Lys Gln Ala Tyr Leu Ala Asp Lys Thr Tyr Phe Ser  
180 185 190

Glu Lys Thr Ala Ala Tyr Val Met Thr Lys Glu Asp Ser Ile Asp Val  
195 200 205

Asp Asp His Phe Asp Phe Thr Gly Val Ile Gly Arg Ile Tyr Phe Asp  
210 215 220

Tyr Gln Arg Arg Glu Gln Gln Asn Lys Pro Phe Tyr Lys Arg Glu Leu  
225 230 235 240

Lys Arg Leu Cys Glu Gln Arg Val His Asp Ser Leu Val Ile Gly Asp  
245 250 255

Ser Arg Leu Leu Ala Leu Leu Leu Asp Gly Phe Asp Asn Ile Ser Ile  
260 265 270

Gly Gly Met Thr Ala Ser Thr Ser Leu Glu Asn Gln Gly Leu Phe Leu  
275 280 285

Ala Thr Pro Ile Lys Lys Val Leu Leu Ser Leu Gly Val Asn Asp Leu  
290 295 300

Ile Thr Asp Tyr Pro Leu His Met Ile Glu Asp Thr Ile Arg Gln Leu  
305 310 315 320

Met Glu Ser Leu Val Ser Lys Ala Glu Gln Val Glu Val Thr Thr Ile  
325 330 335

Ala Tyr Thr Leu Phe Arg Asp Ser Val Ser Asn Glu Glu Thr Val Gln  
340 345 350

Leu Asn Asp Val Ile Val Gln Ser Ala Ser Glu Leu Gly Ile Ser Val  
355 360 365

Ile Asp Leu Asn Glu Val Val Glu Lys Glu Ala Met Leu Asp Tyr Gln  
370 375 380

Tyr Thr Asn Asp Gly Leu His Phe Asn Gln Ile Gly Gln Glu Arg Val  
385 390 395 400

Asn Gln Leu Ile Leu Thr Ser Leu Thr Arg  
405 410

<210> 29

<211> 6992

<212> DNA

<213> Streptococcus suis

<220>

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<223> CPS1

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<211> 454

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<213> Streptococcus suis

<220>

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<223> CPS1E

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20 25 30

Ile Phe Ile Ile Met Met Val His Tyr Phe Ala Phe Phe Ile Ser Arg  
35 40 45

Met Pro Val Glu Phe Glu Tyr Arg Gly Asn Leu Ile Glu Phe Glu Lys  
50 55 60

Thr Phe Asn Tyr Ser Ile Ile Phe Ala Ile Phe Leu Thr Ala Val Ser  
65 70 75 80

Phe Leu Leu Glu Asn Asn Phe Ala Leu Ser Arg Arg Gly Ala Val Tyr  
85 90 95

Phe Thr Leu Ile Asn Phe Val Leu Val Tyr Leu Phe Asn Val Ile Ile  
100 105 110

Lys Gln Phe Lys Asp Ser Phe Leu Phe Ser Thr Ile Tyr Gln Lys Lys  
115 120 125

Thr Ile Leu Ile Thr Thr Ala Glu Arg Trp Glu Asn Met Gln Val Leu  
130 135 140

Phe Glu Ser His Lys Gln Ile Gln Lys Asn Leu Val Ala Leu Val Val  
145 150 155 160

Leu Gly Thr Glu Ile Asp Lys Ile Asn Leu Ser Leu Pro Leu Tyr Tyr  
165 170 175

Ser Val Glu Glu Ala Ile Glu Phe Ser Thr Arg Glu Val Val Asp His  
180 185 190

Val Phe Ile Asn Leu Pro Ser Glu Phe Leu Asp Val Lys Gln Phe Val  
195 200 205

Ser Asp Phe Glu Leu Leu Gly Ile Asp Val Ser Val Asp Ile Asn Ser

210            215            220

Phe Gly Phe Thr Ala Leu Lys Asn Lys Lys Ile Gln Leu Leu Gly Asp  
225            230            235            240

His Ser Ile Val Thr Phe Ser Thr Asn Phe Tyr Lys Pro Ser His Ile  
245            250            255

Met Met Lys Arg Leu Leu Asp Ile Leu Gly Ala Val Val Gly Leu Ile  
260            265            270

Ile Cys Gly Ile Val Ser Ile Leu Leu Val Pro Ile Ile Arg Arg Asp  
275            280            285

Gly Gly Pro Ala Ile Phe Ala Gln Lys Arg Val Gly Gln Asn Gly Arg  
290            295            300

Ile Phe Thr Phe Tyr Lys Phe Arg Ser Met Tyr Val Asp Ala Glu Glu  
305            310            315            320

Arg Lys Lys Asp Leu Leu Ser Gln Asn Gln Met Gln Gly Trp Val Cys  
325            330            335

Phe Lys Met Gly Lys Thr Ile Leu Glu Leu Leu Gln Leu Asp Ile Ser  
340            345            350

Tyr Ala Lys Thr Ser Leu Asp Glu Leu Pro Gln Phe Tyr Asn Val Leu  
355            360            365

Ile Gly Asp Met Ser Leu Val Gly Thr Arg Pro Pro Thr Val Asp Glu  
370            375            380

Phe Glu Lys Tyr Thr Pro Gly Gln Lys Arg Arg Leu Ser Phe Lys Pro  
385            390            395            400

Gly Ile Thr Gly Leu Trp Gln Val Ser Gly Arg Ser Asn Ile Thr Asp  
405            410            415

Phe Asp Asp Val Val Arg Leu Asp Leu Ala Tyr Ile Asp Asn Trp Thr  
420            425            430

Ile Trp Ser Asp Ile Lys Ile Leu Leu Lys Thr Val Lys Val Val Leu  
435            440            445

Leu Arg Glu Gly Ser Lys

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<210> 31

<211> 149

<212> PRT

<213> Streptococcus suis

<220>

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<223> CPS1F

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Tyr Leu Leu Lys Pro Phe Trp Lys Glu Glu Glu Arg Phe Trp Val Thr  
20           25           30

Phe Asp Lys Glu Asp Ala Arg Ser Leu Leu Lys Asn Glu Lys Met Tyr  
35           40           45

Pro Cys Tyr Phe Pro Thr Asn Arg Asn Leu Ile Asn Leu Val Lys Asn  
50           55           60

Thr Phe Leu Ala Phe Lys Ile Leu Arg Asp Glu Lys Pro Asp Val Ile  
65           70           75           80

Ile Ser Ser Gly Ala Ala Val Ala Val Pro Phe Phe Tyr Ile Gly Lys  
85           90           95

Leu Phe Gly Ala Lys Thr Ile Tyr Ile Glu Val Phe Asp Arg Val Asn  
100          105         110

Lys Ser Thr Leu Thr Gly Lys Leu Val Tyr Pro Val Thr Asp Ile Phe  
115          120         125

Ile Val Gln Trp Glu Glu Met Lys Lys Val Tyr Pro Lys Ser Ile Asn  
130                135                140

Leu Gly Ser Ile Phe  
145

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<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS1G

<400> 32

Met Ile Phe Val Thr Val Gly Thr His Glu Gln Gln Phe Asn Arg Leu  
1                5                10                15

Ile Lys Glu Ile Asp Leu Leu Lys Lys Asn Gly Ser Ile Thr Asp Glu  
20                25                30

Ile Phe Ile Gln Thr Gly Tyr Ser Asp Tyr Ile Pro Glu Tyr Cys Lys  
35                40                45

Tyr Lys Lys Phe Leu Ser Tyr Lys Glu Met Glu Gln Tyr Ile Asn Lys  
50                55                60

Ser Glu Val Val Ile Cys His Gly Gly Pro Ala Thr Phe Met Asn Ser  
65                70                75                80

Leu Ser Lys Gly Lys Lys Gln Leu Leu Phe Pro Arg Gln Lys Lys Tyr  
85                90                95

Gly Glu His Val Asn Asp His Gln Val Glu Phe Val Arg Arg Ile Leu  
100                105                110

Gln Asp Asn Asn Ile Leu Phe Ile Glu Asn Ile Asp Asp Leu Phe Glu  
115 120 125

Lys Ile Ile Glu Val Ser Lys Gln Thr Asn Phe Thr Ser Asn Asn Asn  
130 135 140

Phe Phe Cys Glu Arg Leu Lys Gln Ile Val Glu Lys Phe Asn Glu Asp  
145 150 155 160

Gln Glu Asn Glu

<210> 33

<211> 388

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS1H

<400> 33

Met Phe Lys Leu Phe Lys Tyr Asp Pro Glu Tyr Phe Ile Phe Lys Tyr  
1 5 10 15

Phe Trp Leu Ile Ile Phe Ile Pro Glu Gln Lys Tyr Val Phe Leu Leu  
20 25 30

Ile Phe Met Asn Leu Ile Leu Phe His Ile Lys Phe Leu Lys Thr Lys  
35 40 45

Leu Ile Leu Lys Asn Glu Ile Leu Leu Phe Leu Leu Trp Ser Ile Leu  
50 55 60

Cys Phe Val Ser Val Val Thr Ser Met Phe Val Glu Ile Asn Phe Glu  
65 70 75 80

Arg Leu Phe Ala Asp Phe Thr Ala Pro Ile Ile Trp Ile Ile Ala Ile  
85 90 95

Met Tyr Tyr Asn Leu Tyr Ser Phe Ile Asn Ile Asp Tyr Lys Lys Leu  
100 105 110

Lys Asn Ser Ile Phe Phe Ser Phe Leu Val Leu Leu Gly Ile Ser Ala  
115 120 125

Leu Tyr Ile Ile Gln Asn Gly Lys Asp Ile Val Phe Leu Asp Arg His  
130 135 140

Leu Ile Gly Leu Asp Tyr Leu Ile Thr Gly Val Lys Thr Arg Leu Val  
145 150 155 160

Gly Phe Met Asn Tyr Pro Thr Leu Asn Thr Thr Ile Ile Val Ser  
165 170 175

Ile Pro Leu Ile Phe Ala Leu Ile Lys Asn Lys Met Gln Gln Phe Phe  
180 185 190

Phe Leu Cys Leu Ala Phe Ile Pro Ile Tyr Leu Ser Gly Ser Arg Ile  
195 200 205

Gly Ser Leu Ser Leu Ala Ile Leu Ile Ile Cys Leu Leu Trp Arg Tyr  
210 215 220

Ile Gly Gly Lys Phe Ala Trp Ile Lys Lys Leu Ile Val Ile Phe Val  
225 230 235 240

Ile Leu Leu Ile Ile Leu Asn Thr Glu Leu Leu Tyr His Glu Ile Leu  
245 250 255

Ala Val Tyr Asn Ser Arg Glu Ser Ser Asn Glu Ala Arg Phe Ile Ile  
260 265 270

Tyr Gln Gly Ser Ile Asp Lys Val Leu Glu Asn Asn Ile Leu Phe Gly  
275 280 285

Tyr Gly Ile Ser Glu Tyr Ser Val Thr Gly Thr Trp Leu Gly Ser His  
290 295 300

Ser Gly Tyr Ile Ser Phe Phe Tyr Lys Ser Gly Ile Val Gly Leu Ile

305            310            315            320  
Leu Leu Met Phe Ser Phe Phe Tyr Val Ile Lys Lys Ser Tyr Gly Val  
325            330            335  
  
Asn Gly Glu Thr Ala Leu Phe Tyr Phe Thr Ser Leu Ala Ile Phe Phe  
340            345            350  
  
Ile Tyr Glu Thr Ile Asp Pro Ile Ile Ile Leu Val Leu Phe Phe  
355            360            365  
  
Ser Ser Ile Gly Ile Trp Asn Asn Ile Asn Phe Lys Lys Asp Met Glu  
370            375            380  
  
Thr Lys Asn Glu  
385

<210> 34  
  
<211> 322  
  
<212> PRT  
  
<213> Streptococcus suis  
  
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<221> misc\_feature  
  
<223> CPS1I  
  
<400> 34

Met Asn Asp Leu Ile Ser Val Ile Val Pro Ile Tyr Asn Val Gln Asp  
1            5            10            15

Tyr Leu Asp Lys Cys Ile Asn Ser Ile Ile Asn Gln Thr Tyr Thr Asn  
20            25            30

Leu Glu Val Ile Leu Val Asn Asp Gly Ser Thr Asp Asp Ser Glu Lys  
35            40            45

Ile Cys Leu Asn Tyr Met Lys Asn Asp Gly Arg Ile Lys Tyr Tyr Lys

50            55            60

Lys Ile Asn Gly Gly Leu Ala Asp Ala Arg Asn Phe Gly Leu Glu His  
65            70            75            80

Ala Thr Gly Lys Tyr Ile Ala Phe Val Asp Ser Asp Asp Tyr Ile Glu  
85            90            95

Val Ala Met Phe Glu Arg Met His Asp Asn Ile Thr Glu Tyr Asn Ala  
100            105            110

Asp Ile Ala Glu Ile Asp Phe Cys Leu Val Asp Glu Asn Gly Tyr Thr  
115            120            125

Lys Lys Lys Arg Asn Ser Asn Phe His Val Leu Thr Arg Glu Glu Thr  
130            135            140

Val Lys Glu Phe Leu Ser Gly Ser Asn Ile Glu Asn Asn Val Trp Cys  
145            150            155            160

Lys Leu Tyr Ser Arg Asp Ile Ile Lys Asp Ile Lys Phe Gln Ile Asn  
165            170            175

Asn Arg Ser Ile Gly Glu Asp Leu Leu Phe Asn Leu Glu Val Leu Asn  
180            185            190

Asn Val Thr Arg Val Val Val Asp Thr Arg Glu Tyr Tyr Tyr Asn Tyr  
195            200            205

Val Ile Arg Asn Ser Ser Leu Ile Asn Gln Lys Phe Ser Ile Asn Asn  
210            215            220

Ile Asp Leu Val Thr Arg Leu Glu Asn Tyr Pro Phe Lys Leu Lys Arg  
225            230            235            240

Glu Phe Ser His Tyr Phe Asp Ala Lys Val Ile Lys Glu Lys Val Lys  
245            250            255

Cys Leu Asn Lys Met Tyr Ser Thr Asp Cys Leu Asp Asn Glu Phe Leu  
260            265            270

Pro Ile Leu Glu Ser Tyr Arg Lys Glu Ile Arg Arg Tyr Pro Phe Ile  
275            280            285

Lys Ala Lys Arg Tyr Leu Ser Arg Lys His Leu Val Thr Leu Tyr Leu  
290                295                300

Met Lys Phe Ser Pro Lys Leu Tyr Val Met Leu Tyr Lys Lys Phe Gln  
305                310                315                320

Lys Gln

<210> 35

<211> 322

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS1J

<400> 35

Met Asp Lys Ile Ser Val Ile Val Pro Val Tyr Asn Val Asp Lys Tyr  
1                5                10                15

Leu Ser Ser Cys Ile Glu Ser Ile Ile Asn Gln Asn Tyr Lys Asn Ile  
20                25                30

Glu Ile Leu Leu Ile Asp Asp Gly Ser Val Asp Asp Ser Ala Lys Ile  
35                40                45

Cys Lys Glu Tyr Glu Lys Asp Lys Arg Val Lys Ile Phe Phe Thr Asn  
50                55                60

His Ser Gly Val Ser Asn Ala Arg Asn His Gly Ile Lys Arg Ser Thr  
65                70                75                80

Ala Glu Tyr Ile Met Phe Val Asp Ser Asp Asp Val Val Asp Ser Arg  
85                90                95

Leu Val Glu Lys Leu Tyr Phe Asn Ile Ile Lys Ser Arg Ser Asp Leu  
100 105 110

Ser Gly Cys Leu Tyr Ala Thr Phe Ser Glu Asn Ile Asn Asn Phe Glu  
115 120 125

Val Asn Asn Pro Asn Ile Asp Phe Glu Ala Ile Asn Thr Val Gln Asp  
130 135 140

Met Gly Glu Lys Asn Phe Met Asn Leu Tyr Ile Asn Asn Ile Phe Ser  
145 150 155 160

Thr Pro Val Cys Lys Leu Tyr Lys Arg Tyr Ile Thr Asp Leu Phe  
165 170 175

Gln Glu Asn Gln Trp Leu Gly Glu Asp Leu Leu Phe Asn Leu His Tyr  
180 185 190

Leu Lys Asn Ile Asp Arg Val Ser Tyr Leu Thr Glu His Leu Tyr Phe  
195 200 205

Tyr Arg Arg Gly Ile Leu Ser Thr Val Asn Ser Phe Lys Glu Gly Val  
210 215 220

Phe Leu Gln Leu Glu Asn Leu Gln Lys Gln Val Ile Val Leu Phe Lys  
225 230 235 240

Gln Ile Tyr Gly Glu Asp Phe Asp Val Ser Ile Val Lys Asp Thr Ile  
245 250 255

Arg Trp Gln Val Phe Tyr Tyr Ser Leu Leu Met Phe Lys Tyr Gly Lys  
260 265 270

Gln Ser Ile Phe Asp Lys Phe Leu Ile Phe Arg Asn Leu Tyr Lys Lys  
275 280 285

Tyr Tyr Phe Asn Leu Leu Lys Val Ser Asn Lys Asn Ser Leu Ser Lys  
290 295 300

Asn Phe Cys Ile Arg Ile Val Ser Asn Lys Val Phe Lys Lys Ile Leu  
305 310 315 320

Trp Leu

<210> 36

<211> 278

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS1K

<400> 36

Met Asp Thr Ile Ser Lys Ile Ser Ile Ile Val Pro Ile Tyr Asn Val  
1           5           10           15

Glu Lys Tyr Leu Ser Lys Cys Ile Asp Ser Ile Val Asn Gln Thr Tyr  
20           25           30

Lys His Ile Glu Ile Leu Leu Val Asn Asp Gly Ser Thr Asp Asn Ser  
35           40           45

Glu Glu Ile Cys Leu Ala Tyr Ala Lys Lys Asp Ser Arg Ile Arg Tyr  
50           55           60

Phe Lys Lys Glu Asn Gly Gly Leu Ser Asp Ala Arg Asn Tyr Ile  
65           70           75           80

Ser Arg Ala Lys Gly Asp Tyr Leu Ala Phe Ile Asp Ser Asp Asp Phe  
85           90           95

Ile His Ser Glu Phe Ile Gln Arg Leu His Glu Ala Ile Glu Arg Glu  
100          105          110

Asn Ala Leu Val Ala Val Ala Gly Tyr Asp Arg Val Asp Ala Ser Gly  
115          120          125

His Phe Leu Thr Ala Glu Pro Leu Pro Thr Asn Gln Ala Val Leu Ser

130 135 140

Gly Arg Asn Val Cys Lys Lys Leu Leu Glu Ala Asp Gly His Arg Phe  
145 150 155 160

Val Val Ala Cys Asn Lys Leu Tyr Lys Lys Glu Leu Phe Glu Asp Phe  
165 170 175

Arg Phe Glu Lys Gly Lys Ile His Glu Asp Glu Tyr Phe Thr Tyr Arg  
180 185 190

Leu Leu Tyr Glu Leu Glu Lys Val Ala Ile Val Lys Glu Cys Leu Tyr  
195 200 205

Tyr Tyr Val Asp Arg Glu Asn Ser Ile Thr Thr Ser Ser Met Thr Asp  
210 215 220

His Arg Phe His Cys Leu Leu Glu Phe Gln Asn Glu Arg Met Asp Phe  
225 230 235 240

Tyr Glu Ser Arg Gly Asp Lys Glu Leu Leu Leu Glu Cys Tyr Arg Ser  
245 250 255

Phe Leu Ala Phe Ala Val Leu Phe Leu Gly Lys Tyr Asn His Trp Leu  
260 265 270

Ser Lys Gln Gln Lys Lys  
275

<210> 37

<211> 4519

<212> DNA

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS9

<400> 37  
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aagtttatcc tgaaatacga ttgtgctatg gtgctgaatt gtattatgt aaagatata 180  
taagcaaact tgaaaaaaag aaagtaccca cactaatgg ctgcgcstat attctttgg 240  
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agagagtaga agagtttaatt gacaaggat gctatactca ggtttatgt aatcatgtgc 420  
tgaagcccac tttttttttt gatcgagcaa aagaattaa aaaacgtact cggttttttt 480  
tagagcagga tttagtacat tgtgttgcta gcgatatgc taatttatct agtagaccc 540  
cgtttatgag ggaggctttaat aagttgctaa cagaggaatt tggcaagat aaagcgaaag 600  
cgttgctaaa aaagaatcct ttatgcataa taaaaacca ggcattaa actggttact 660  
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tggttacaggtt ttaaacggc caggtcagac tcaatttgcg gcagtccgg tggaaatgt 2040  
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<210> 38

<211> 215

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS9D

<400> 38

Ala Tyr Arg Gln Gly Val Arg Tyr Ile Val Ala Thr Ser His Arg Arg  
1 5 10 15

Lys Gly Met Phe Glu Thr Pro Glu Lys Val Ile Met Thr Asn Phe Leu

20            25            30

Gln Phe Lys Asp Ala Val Ala Glu Val Tyr Pro Glu Ile Arg Leu Cys  
35            40            45

Tyr Gly Ala Glu Leu Tyr Tyr Ser Lys Asp Ile Leu Ser Lys Leu Glu  
50            55            60

Lys Lys Lys Val Pro Thr Leu Asn Gly Ser Arg Tyr Ile Leu Leu Glu  
65            70            75            80

Phe Ser Ser Asp Thr Pro Trp Lys Glu Ile Gln Glu Ala Val Asn Glu  
85            90            95

Val Thr Leu Leu Gly Leu Thr Pro Val Leu Ala His Ile Glu Arg Tyr  
100            105            110

Asp Ala Leu Ala Phe His Ala Glu Arg Val Glu Glu Leu Ile Asp Lys  
115            120            125

Gly Cys Tyr Thr Gln Val Asn Ser Asn His Val Leu Lys Pro Thr Leu  
130            135            140

Ile Gly Asp Arg Ala Lys Glu Phe Lys Lys Arg Thr Arg Tyr Phe Leu  
145            150            155            160

Glu Gln Asp Leu Val His Cys Val Ala Ser Asp Met His Asn Leu Ser  
165            170            175

Ser Arg Pro Pro Phe Met Arg Glu Ala Tyr Lys Leu Leu Thr Glu Glu  
180            185            190

Phe Gly Lys Asp Lys Ala Lys Ala Leu Leu Lys Lys Asn Pro Leu Met  
195            200            205

Leu Leu Lys Asn Gln Ala Ile  
210            215

<210> 39

<211> 608

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS9E

<400> 39

Met Asp Leu Gly Thr Val Thr Asp Lys Leu Leu Glu Arg Asn Ser Lys  
1 5 10 15

Arg Leu Ile Leu Val Cys Met Asp Thr Cys Leu Leu Ile Val Ser Met  
20 25 30

Ile Leu Ser Arg Leu Phe Leu Asp Val Ile Ile Asp Ile Pro Asp Glu  
35 40 45

Arg Phe Ile Leu Ala Val Leu Phe Val Ser Ile Leu Tyr Leu Ile Leu  
50 55 60

Ser Phe Arg Leu Lys Val Phe Ser Leu Ile Thr Arg Tyr Thr Gly Tyr  
65 70 75 80

Gln Ser Tyr Val Lys Ile Gly Leu Ser Leu Ile Ser Ala His Ser Leu  
85 90 95

Phe Leu Ile Ile Ser Met Val Leu Trp Gln Ala Phe Ser Tyr Arg Phe  
100 105 110

Ile Leu Val Ser Leu Phe Leu Ser Tyr Val Met Leu Ile Thr Pro Arg  
115 120 125

Ile Val Trp Lys Val Leu His Glu Thr Arg Lys Asn Ala Ile Arg Lys  
130 135 140

Lys Asp Ser Pro Leu Arg Ile Leu Val Val Gly Ala Gly Asp Gly Gly  
145 150 155 160

Asn Ile Phe Ile Asn Thr Val Lys Asp Arg Lys Leu Asn Phe Glu Ile  
165 170 175

Val Gly Ile Val Asp Arg Asp Pro Asn Lys Leu Gly Thr Phe Ile Arg  
180            185            190

Thr Ala Lys Val Leu Gly Asn Arg Asn Asp Ile Pro Arg Leu Val Glu  
195            200            205

Glu Leu Ala Val Asp Gln Val Thr Ile Ala Ile Pro Ser Leu Asn Gly  
210            215            220

Lys Glu Arg Glu Lys Ile Val Glu Ile Cys Asn Thr Thr Gly Val Thr  
225            230            235            240

Val Asn Asn Met Pro Ser Ile Glu Asp Ile Met Ala Gly Asn Met Ser  
245            250            255

Val Ser Ala Phe Gln Glu Ile Asp Val Ala Asp Leu Leu Gly Arg Pro  
260            265            270

Glu Val Val Leu Asp Gln Asp Glu Leu Asn Gln Phe Phe Gln Gly Lys  
275            280            285

Thr Ile Leu Val Thr Gly Ala Gly Gly Ser Ile Gly Ser Glu Leu Cys  
290            295            300

Arg Gln Ile Ala Lys Phe Thr Pro Lys Arg Leu Leu Leu Gly His  
305            310            315            320

Gly Glu Asn Ser Ile Tyr Leu Ile His Arg Glu Leu Leu Glu Lys Tyr  
325            330            335

Gln Gly Lys Ile Glu Leu Val Pro Leu Ile Ala Asp Ile Gln Asp Arg  
340            345            350

Glu Leu Ile Phe Ser Ile Met Ala Glu Tyr Gln Pro Asp Val Val Tyr  
355            360            365

His Ala Ala Ala His Lys His Val Pro Leu Met Glu Tyr Asn Pro His  
370            375            380

Glu Ala Val Lys Asn Asn Ile Phe Gly Thr Lys Asn Val Ala Glu Ala  
385            390            395            400

Ala Lys Thr Ala Lys Val Ala Lys Phe Val Met Val Ser Thr Asp Lys

405 410 415

Ala Val Asn Pro Pro Asn Val Met Gly Ala Thr Lys Arg Val Ala Glu  
420 425 430

Met Ile Val Thr Gly Leu Asn Glu Pro Gly Gln Thr Gln Phe Ala Ala  
435 440 445

Val Arg Phe Gly Asn Val Leu Gly Ser Arg Gly Ser Val Val Pro Leu  
450 455 460

Phe Lys Glu Gln Ile Arg Lys Gly Gly Pro Val Thr Val Thr Asp Phe  
465 470 475 480

Arg Met Thr Arg Tyr Phe Met Thr Ile Pro Glu Ala Ser Arg Leu Val  
485 490 495

Ile Gln Ala Gly His Leu Ala Lys Gly Gly Glu Ile Phe Val Leu Asp  
500 505 510

Met Gly Glu Pro Val Gln Ile Leu Glu Leu Ala Arg Lys Val Ile Leu  
515 520 525

Leu Ser Gly His Thr Glu Glu Glu Ile Gly Ile Val Glu Ser Gly Ile  
530 535 540

Arg Pro Gly Glu Lys Leu Tyr Glu Glu Leu Leu Ser Thr Glu Glu Arg  
545 550 555 560

Val Ser Glu Gln Ile His Glu Lys Ile Phe Val Gly Arg Val Thr Asn  
565 570 575

Lys Gln Ser Asp Ile Val Asn Ser Phe Ile Asn Gly Leu Leu Gln Lys  
580 585 590

Asp Arg Asn Glu Leu Lys Asn Met Leu Ile Glu Phe Ala Lys Gln Glu  
595 600 605

<210> 40

<211> 200

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS9F

<400> 40

Met Tyr Pro Ile Cys Lys Arg Ile Leu Ala Ile Ile Ser Gly Ile

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Ala Ile Val Val Leu Ser Pro Ile Leu Leu Leu Ile Ala Leu Ala Ile

20           25           30

Lys Leu Asp Ser Lys Gly Pro Val Leu Phe Lys Gln Lys Arg Val Gly

35           40           45

Lys Asn Lys Ser Tyr Phe Met Ile Tyr Lys Phe Arg Ser Met Tyr Val

50           55           60

Asp Ala Pro Ser Asp Met Pro Thr His Leu Leu Lys Asp Pro Lys Ala

65           70           75           80

Met Ile Thr Lys Val Gly Ala Phe Leu Arg Lys Thr Ser Leu Asp Glu

85           90           95

Leu Pro Gln Leu Phe Asn Ile Phe Lys Gly Glu Met Ala Ile Val Gly

100          105         110

Pro Arg Pro Ala Leu Trp Asn Gln Tyr Asp Leu Ile Glu Glu Arg Asp

115          120         125

Lys Tyr Gly Ala Asn Asp Ile Arg Pro Gly Leu Thr Gly Trp Ala Gln

130          135         140

Ile Asn Gly Arg Asp Glu Leu Glu Ile Asp Glu Lys Ser Lys Leu Asp

145          150         155         160

Gly Tyr Tyr Val Gln Asn Met Ser Leu Gly Leu Asp Ile Lys Cys Phe

165          170         175

Leu Gly Thr Phe Leu Ser Val Ala Arg Ser Glu Gly Val Val Glu Gly  
180            185            190

Gly Thr Gly Gln Lys Gly Lys Gly  
195            200

<210> 41

<211> 269

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS2G

<400> 41

Met Lys Phe Ser Val Leu Met Ser Val Tyr Glu Lys Glu Lys Pro Glu  
1            5            10            15

Phe Leu Arg Glu Ser Leu Glu Ser Ile Leu Val Asn Gln Thr Met Ile  
20            25            30

Pro Thr Glu Val Val Leu Val Glu Asp Gly Pro Leu Asn Gln Ser Leu  
35            40            45

Tyr Ser Ile Leu Glu Glu Phe Lys Ser Arg Phe Ser Phe Phe Lys Thr  
50            55            60

Ile Ala Leu Glu Lys Asn Ser Gly Leu Gly Ile Ala Leu Asn Glu Gly  
65            70            75            80

Leu Lys His Cys Asn Tyr Glu Trp Val Cys Thr Lys Trp Ile Leu Met  
85            90            95

Met Leu His Ile His Thr Arg Phe Glu Lys Gln Val Asn Phe Ile Lys  
100            105            110

Gln Asn Pro Thr Ile Asp Ile Glu Ile Asp Glu Phe Leu Asn Ser Thr  
115 120 125

Ser Glu Ile Val Ser His Lys Asn Val Pro Thr Gln His Asp Glu Ile  
130 135 140

Leu Lys Met Ala Arg Arg Glu Lys Ser Met Cys His Met Thr Val Met  
145 150 155 160

Phe Lys Lys Ser Val Glu Arg Ala Gly Gly Tyr Gln Thr Leu Pro  
165 170 175

Tyr Val Glu Asp Tyr Phe Leu Trp Val Arg Met Ile Ala Ser Gly Ser  
180 185 190

Lys Phe Ala Asn Ile Asp Glu Thr Leu Val Leu Ala Arg Val Gly Asn  
195 200 205

Gly Met Phe Asn Arg Arg Gly Asn Arg Glu Gln Ile Asn Ser Trp Thr  
210 215 220

Leu Leu Ile Glu Phe Met Leu Ala Gln Gly Ile Val Thr Pro Leu Asp  
225 230 235 240

Val Phe Ile Asn Gln Ile Tyr Ile Arg Val Phe Val Tyr Met Pro Thr  
245 250 255

Trp Ile Lys Lys Leu Ile Tyr Gly Lys Ile Leu Arg Lys  
260 265

<210> 42

<211> 143

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS9H

<400> 42

Met Ile Thr Val Leu Met Ala Thr Tyr Asn Gly Ser Pro Phe Ile Ile  
1 5 10 15

Lys Gln Leu Asp Ser Ile Arg Asn Gln Ser Val Ser Ala Asp Lys Val  
20 25 30

Ile Ile Trp Asp Asp Cys Ser Thr Asp Asp Thr Ile Lys Ile Ile Lys  
35 40 45

Asp Tyr Ile Lys Lys Tyr Ser Leu Asp Ser Trp Val Val Ser Gln Asn  
50 55 60

Lys Ser Asn Gln Gly His Tyr Gln Thr Phe Ile Asn Leu Thr Lys Leu  
65 70 75 80

Val Gln Glu Gly Ile Val Phe Phe Ser Asp Gln Asp Asp Ile Trp Asp  
85 90 95

Cys His Lys Ile Glu Thr Met Leu Pro Ile Phe Asp Arg Glu Asn Val  
100 105 110

Ser Met Val Phe Cys Lys Ser Arg Leu Ile Asp Glu Asn Gly Asn Ile  
115 120 125

Ile Ser Ser Pro Asp Thr Ser Asp Arg Ile Asn Thr Tyr Ser Leu  
130 135 140

<210> 43

<211> 3738

<212> DNA

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS7

<400> 43

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ttatggtttc aacagataaa gctgttaatc cgccaaatgt catggagcg actaaacgtg 180  
ttgcagaaat gattgtaca ggtttaaacg agccaggtca gactcaattt gcggcagtcc 240  
gttttggaa ttttttaggt agtcgtggaa gtgttgtcc gctattcaaa gagcaaatta 300  
gaaaagggtgg acctgttacg gttaccgact ttaggatgac tcgttatttc atgacgattc 360  
ctgaggcaag tcgttgggtt atccaagctg gacatttggc aaaagggtgga gaaatcttg 420  
tcttggatat gggtgagcca gtacaaatcc tggaatttggc aagaaaaagt atcttggtaa 480  
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3738

<210> 44

<211> 238

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS7E

<400> 44

Ala Ala His Lys His Val Pro Leu Met Glu Tyr Asn Pro His Glu Ala

1 5 10 15

Val Lys Asn Asn Ile Phe Gly Thr Lys Asn Val Ala Glu Ala Ala Lys

20 25 30

Thr Ala Lys Val Ala Lys Phe Val Met Val Ser Thr Asp Lys Ala Val

35 40 45

Asn Pro Pro Asn Val Met Gly Ala Thr Lys Arg Val Ala Glu Met Ile

50 55 60

Val Thr Gly Leu Asn Glu Pro Gly Gln Thr Gln Phe Ala Ala Val Arg

65 70 75 80

Phe Gly Asn Val Leu Gly Ser Arg Gly Ser Val Val Pro Leu Phe Lys

85 90 95

Glu Gln Ile Arg Lys Gly Gly Pro Val Thr Val Thr Asp Phe Arg Met

100 105 110

Thr Arg Tyr Phe Met Thr Ile Pro Glu Ala Ser Arg Leu Val Ile Gln

115 120 125

Ala Gly His Leu Ala Lys Gly Gly Glu Ile Phe Val Leu Asp Met Gly

130 135 140

Glu Pro Val Gln Ile Leu Glu Leu Ala Arg Lys Val Ile Leu Leu Ser  
145            150            155            160

Gly His Thr Glu Glu Glu Ile Gly Ile Val Glu Ser Gly Ile Arg Pro  
165            170            175

Gly Glu Lys Leu Tyr Glu Glu Leu Leu Ser Thr Glu Glu Arg Val Ser  
180            185            190

Glu Gln Ile His Glu Lys Ile Phe Val Gly Arg Val Thr Asn Lys Gln  
195            200            205

Ser Asp Ile Val Asn Ser Phe Ile Asn Gly Leu Leu Gln Lys Asp Arg  
210            215            220

Asn Glu Leu Lys Asp Met Leu Ile Glu Phe Ala Lys Gln Glu  
225            230            235

<210> 45

<211> 232

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS7F

<400> 45

Met Thr Arg Val Glu Leu Ile Thr Arg Glu Phe Phe Lys Lys Asn Glu  
1            5            10            15

Ala Thr Ser Lys Tyr Phe Gln Lys Ile Glu Ser Arg Arg Gly Glu Leu  
20            25            30

Phe Ile Lys Phe Phe Met Asp Lys Leu Leu Ala Leu Ile Leu Leu  
35            40            45

Leu Leu Ser Pro Val Ile Ile Ile Leu Ala Ile Trp Ile Lys Leu Asp  
50 55 60

Ser Lys Gly Pro Ile Phe Tyr Arg Gln Glu Arg Val Thr Arg Tyr Gly  
65 70 75 80

Arg Ile Phe Arg Ile Phe Lys Phe Arg Thr Met Ile Ser Asp Ala Asp  
85 90 95

Lys Val Gly Ser Leu Val Thr Val Gly Gln Asp Asn Arg Ile Thr Lys  
100 105 110

Val Gly His Ile Ile Arg Lys Tyr Arg Leu Asp Glu Val Pro Gln Leu  
115 120 125

Phe Asn Val Leu Met Gly Asp Met Ser Phe Val Gly Val Arg Pro Glu  
130 135 140

Val Gln Lys Tyr Val Asn Gln Tyr Thr Asp Glu Met Phe Ala Thr Leu  
145 150 155 160

Leu Leu Pro Ala Gly Ile Thr Ser Pro Ala Ser Ile Ala Tyr Lys Asp  
165 170 175

Glu Asp Ile Val Leu Glu Glu Tyr Cys Ser Gln Gly Tyr Ser Pro Asp  
180 185 190

Glu Ala Tyr Val Gln Lys Val Leu Pro Glu Lys Met Lys Tyr Asn Leu  
195 200 205

Glu Tyr Ile Arg Asn Phe Gly Ile Ile Ser Asp Phe Lys Val Met Ile  
210 215 220

Asp Thr Val Ile Lys Val Ile Lys  
225 230

<210> 46

<211> 404

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS7G

<400> 46

Met Thr Lys Arg Gln Asn Ile Pro Phe Ser Pro Pro Asp Ile Thr Gln  
1           5           10           15

Ala Glu Ile Asp Glu Val Ile Asp Thr Leu Lys Ser Gly Trp Ile Thr  
20           25           30

Thr Gly Pro Lys Thr Lys Glu Leu Glu Arg Arg Leu Ser Val Phe Thr  
35           40           45

Gly Thr Asn Lys Thr Val Cys Leu Asn Ser Ala Thr Ala Gly Leu Glu  
50           55           60

Leu Val Leu Arg Ile Leu Gly Val Gly Pro Gly Asp Glu Val Ile Val  
65           70           75           80

Pro Ala Met Thr Tyr Thr Ala Ser Cys Ser Val Ile Thr His Val Gly  
85           90           95

Ala Thr Pro Val Met Val Asp Ile Gln Lys Asn Ser Phe Glu Met Glu  
100          105          110

Tyr Asp Ala Leu Glu Lys Ala Ile Thr Pro Lys Thr Lys Val Ile Ile  
115          120          125

Pro Val Asp Leu Ala Gly Ile Pro Cys Asp Tyr Asp Lys Ile Tyr Thr  
130          135          140

Ile Val Glu Asn Lys Arg Ser Leu Tyr Val Ala Ser Asp Asn Lys Trp  
145          150          155          160

Gln Lys Leu Phe Gly Arg Val Ile Ile Leu Ser Asp Ser Ala His Ser  
165          170          175

Leu Gly Ala Ser Tyr Lys Gly Lys Pro Ala Gly Ser Leu Ala Asp Phe

180            185            190

Thr Ser Phe Ser Phe His Ala Val Lys Asn Phe Thr Thr Ala Glu Gly  
195            200            205

Gly Ser Val Thr Trp Arg Ser His Pro Asp Leu Asp Asp Glu Glu Met  
210            215            220

Tyr Lys Glu Phe Gln Ile Tyr Ser Leu His Gly Gln Thr Lys Asp Ala  
225            230            235            240

Leu Ala Lys Thr Gln Leu Gly Ser Trp Glu Tyr Asp Ile Val Ile Pro  
245            250            255

Gly Tyr Lys Cys Asn Met Thr Asp Ile Met Ala Gly Ile Gly Leu Val  
260            265            270

Gln Leu Glu Arg Tyr Pro Ser Leu Leu Asn Arg Arg Arg Glu Ile Ile  
275            280            285

Glu Lys Tyr Asn Ala Gly Phe Glu Gly Thr Ser Ile Lys Pro Leu Val  
290            295            300

His Leu Thr Glu Asp Lys Gln Ser Ser Met His Leu Tyr Ile Thr His  
305            310            315            320

Leu Gln Gly Tyr Thr Leu Glu Gln Arg Asn Glu Val Ile Gln Lys Met  
325            330            335

Ala Glu Ala Gly Ile Ala Cys Asn Val His Tyr Lys Pro Leu Pro Leu  
340            345            350

Leu Thr Ala Tyr Lys Asn Leu Gly Phe Glu Met Lys Asp Phe Pro Asn  
355            360            365

Ala Tyr Gln Tyr Phe Glu Asn Glu Val Thr Leu Pro Leu His Thr Asn  
370            375            380

Leu Ser Asp Glu Asp Val Glu Tyr Val Ile Glu Met Phe Leu Lys Ile  
385            390            395            400

Val Ser Arg Asp

<210> 47

<211> 210

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> CPS7H

<400> 47

Met Val Glu Arg Asp Met Val Glu Arg Asp Thr Leu Val Ser Ile Ile  
1           5           10           15

Met Pro Ser Trp Asn Thr Ala Lys Tyr Ile Ser Glu Ser Ile Gln Ser  
20           25           30

Val Leu Asp Gln Thr His Gln Asn Trp Glu Leu Ile Ile Val Asp Asp  
35           40           45

Cys Ser Asn Asp Glu Thr Glu Lys Val Val Ser His Phe Lys Asp Ser  
50           55           60

Arg Ile Lys Phe Phe Lys Asn Ser Asn Asn Leu Gly Ala Ala Leu Thr  
65           70           75           80

Arg Asn Lys Ala Leu Arg Lys Ala Arg Gly Arg Trp Ile Ala Phe Leu  
85           90           95

Asp Ser Asp Asp Leu Trp His Pro Ser Lys Leu Glu Lys Gln Leu Glu  
100          105          110

Phe Met Lys Asn Asn Gly Tyr Ser Phe Thr Tyr His Asn Phe Glu Lys  
115          120          125

Ile Asp Glu Ser Ser Gln Ser Leu Arg Val Leu Val Ser Gly Pro Ala  
130          135          140

Ile Val Thr Arg Lys Met Met Tyr Asn Tyr Gly Tyr Pro Gly Cys Leu  
145            150            155            160

Thr Phe Met Tyr Asp Ala Asp Lys Met Gly Leu Ile Gln Ile Lys Asp  
165            170            175

Ile Lys Lys Asn Asn Asp Tyr Ala Ile Leu Leu Gln Leu Cys Lys Lys  
180            185            190

Tyr Asp Cys Tyr Leu Leu Asn Glu Ser Leu Ala Ser Tyr Arg Ile Arg  
195            200            205

Lys Lys  
210

<210> 48

<211> 101

<212> DNA

<213> Streptococcus suis

<220>

<221> misc\_feature

<222> (1)..(101)

<223> N may be any nucleotide

<220>

<221> misc\_feature

<223> 100 base pair repeat between CPS2G and CPS2H

<400> 48

aagggcacct ctataaactc ccaaattgc gaatttggag ttacgaaagc cttgttaat    60  
caancattt aaattttaga aaatttagtt ttagagctcc c                            101

<210> 49  
<211> 101  
<212> DNA  
<213> Streptococcus suis  
<220>  
<221> misc\_feature  
<222> (1)..(101)  
<223> N may be any nucleotide  
<220>  
<221> misc\_feature  
<223> 100 base pair repeat within CPS2M  
<400> 49  
gggccacccataaaattc ccaaaaatgc gaattcgag ttacgaaagc cttgttaat 60  
caancatctt aaattttaga aaatttagtt ttagaggc c 101  
  
<210> 50  
<211> 101  
<212> DNA  
<213> Streptococcus suis  
<220>  
<221> misc\_feature  
<223> 100 base pair repeat between CPS2O and CPS2P  
<400> 50

aaggcacct ctataaactc ccaaaattgc gaattcgag ttacgaaagc cttgttaat 60

caaacattt aaattttaga aaatttagttt ttagaggc c 101

<210> 51

<211> 120

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> N-terminal part of CPS2J

<400> 51

Met Ala Lys Val Ser Ile Ile Val Pro Ile Phe Asn Thr Glu Lys Tyr  
1 5 10 15

Leu Arg Glu Cys Leu Asp Ser Ile Ile Ser Gln Ser Tyr Thr Asn Leu  
20 25 30

Glu Ile Leu Leu Ile Asp Asp Gly Ser Ser Asp Ser Ser Thr Asp Ile  
35 40 45

Cys Leu Glu Tyr Ala Glu Gln Asp Gly Arg Ile Lys Leu Phe Arg Leu  
50 55 60

Pro Asn Gly Gly Val Ser Asn Ala Arg Asn Tyr Gly Ile Lys Asn Ser  
65 70 75 80

Thr Ala Asn Tyr Ile Met Phe Val Asp Ser Asp Asp Ile Val Asp Gly  
85 90 95

Asn Ile Val Glu Ser Leu Tyr Thr Cys Leu Lys Glu Asn Asp Ser Asp  
100 105 110

Leu Ser Gly Gly Leu Leu Ala Thr

115            120

<210> 52

<211> 120

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> N-terminal part of CPS2K

<220>

<221> misc\_feature

<222> (1)..(120)

<223> Xaa may be any amino acid

<400> 52

Met Ile Asn Ile Ser Ile Ile Val Pro Ile Tyr Asn Val Glu Gln Tyr  
1            5            10            15

Leu Ser Lys Cys Ile Asn Ser Ile Val Asn Gln Thr Tyr Lys His Ile  
20            25            30

Glu Leu Leu Val Asn Asp Gly Ser Ser Thr Asp Asn Ser Glu Glu Ile  
35            40            45

Cys Leu Ala Tyr Ala Lys Lys Asp Ser Arg Ile Arg Tyr Phe Lys Lys  
50            55            60

Glu Asn Gly Gly Leu Ser Asp Ala Arg Asn Tyr Gly Ile Ser Arg Ala  
65            70            75            80

Lys Gly Asp Tyr Leu Ala Phe Ile Asp Ser Asp Asp Phe Ile His Ser  
85            90            95

Glu Phe Ile Gln Arg Leu Xaa His Glu Ala Ile Glu Arg Glu Asn Ala  
100                105                110

Leu Xaa Xaa Val Ala Val Ala Gly  
115                120

<210> 53

<211> 419

<212> PRT

<213> Streptococcus suis

<220>

<221> misc\_feature

<223> ORF2Y

<400> 53

Met Lys Tyr Gln Val Ile Ile Gln Asp Ile Leu Thr Gly Ile Glu  
1                5                10                15

Glu His Arg Phe Lys Arg Gly Glu Lys Leu Pro Ser Ile Arg Gln Leu  
20                25                30

Arg Glu Gln Tyr His Cys Ser Lys Asp Thr Val Gln Lys Ala Met Leu  
35                40                45

Glu Leu Lys Tyr Gln Asn Lys Ile Tyr Ala Val Glu Lys Ser Gly Tyr  
50                55                60

Tyr Ile Leu Glu Asp Arg Asp Phe Gln Asp His Thr Cys Arg Ala Gln  
65                70                75                80

Ser Tyr Arg Leu Ser Arg Ile Thr Tyr Glu Asp Phe Arg Ile Cys Leu  
85                90                95

Lys Glu Ser Leu Ile Gly Arg Glu Asn Tyr Leu Phe Asn Tyr Tyr His  
100                105                110

Gln Gln Glu Gly Leu Ala Glu Leu Ile Ser Ser Val Gln Ser Leu Leu  
115 120 125

Met Asp Tyr His Val Tyr Thr Lys Lys Asp Gln Leu Val Ile Thr Ala  
130 135 140

Gly Ser Gln Gln Ala Leu Tyr Ile Leu Thr Gln Met Glu Thr Leu Ala  
145 150 155 160

Gly Lys Thr Glu Ile Leu Ile Glu Asn Pro Thr Tyr Ser Arg Met Ile  
165 170 175

Glu Leu Ile Arg His Gln Gly Ile Pro Tyr Gln Thr Ile Glu Arg Asn  
180 185 190

Leu Asp Gly Ile Asp Leu Glu Glu Leu Glu Ser Ile Phe Gln Thr Gly  
195 200 205

Lys Ile Lys Phe Phe Tyr Thr Ile Pro Arg Leu His Asn Pro Leu Gly  
210 215 220

Ser Thr Tyr Asp Ile Ala Thr Lys Thr Ala Ile Val Lys Leu Ala Lys  
225 230 235 240

Gln Tyr Asp Val Tyr Ile Ile Glu Asp Asp Tyr Leu Ala Asp Phe Asp  
245 250 255

Ser Ser His Ser Leu Pro Leu His Tyr Leu Asp Thr Asp Asn Arg Val  
260 265 270

Ile Tyr Ile Lys Ser Phe Thr Pro Thr Leu Phe Pro Ala Leu Arg Ile  
275 280 285

Gly Ala Ile Ser Leu Pro Asn Gln Leu Arg Asp Ile Phe Ile Lys His  
290 295 300

Lys Ser Leu Ile Asp Tyr Asp Thr Asn Leu Ile Met Gln Lys Ala Leu  
305 310 315 320

Ser Leu Tyr Ile Asp Asn Gly Met Phe Ala Arg Asn Thr Gln His Leu  
325 330 335

His His Ile Tyr His Ala Gln Trp Asn Lys Ile Lys Asp Cys Leu Glu

340            345            350

Lys Tyr Ala Leu Asn Ile Pro Tyr Arg Ile Pro Lys Gly Ser Val Thr  
355            360            365

Phe Gln Leu Ser Lys Gly Ile Leu Ser Pro Ser Ile Gln His Met Phe  
370            375            380

Gly Lys Cys Tyr Tyr Phe Ser Gly Gln Lys Ala Asp Phe Leu Gln Ile  
385            390            395            400

Phe Phe Glu Gln Asp Phe Ala Asp Lys Leu Glu Gln Phe Val Arg Tyr  
405            410            415

Leu Asn Glu

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